

FIG. 1 WIRELESS ACCESS REFERENCE MODEL

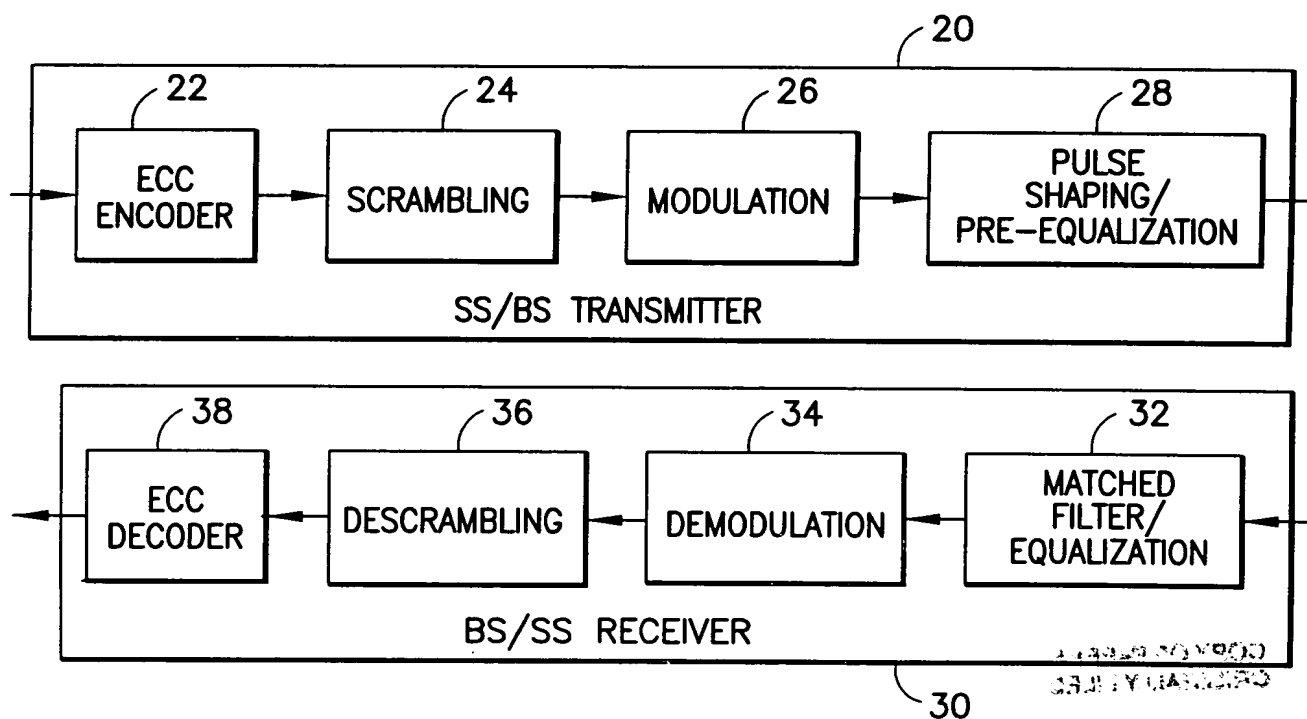


FIG. 2 PHY REFERENCE MODEL SHOWING DATA FLOW

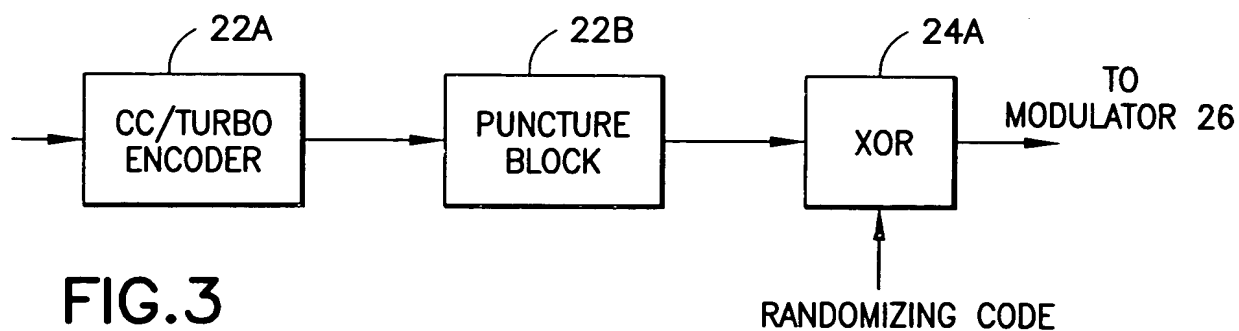


FIG. 3

| MODULATION AND CHANNEL CODING | |
|---------------------------------|--|
| PARAMETER | QPSK w/R=4/5 CODING (1.6 BITS/SYM) |
| RF CHANNEL BANDWIDTH | 3.5 MHz |
| CHIP RATE | 2.56 Mcps |
| COMMUNICATION CHANNEL BANDWIDTH | 4.096 Mbps |
| PEAK DATA RATE | 4.096 Mbps |
| CDMA CHANNEL BANDWIDTH (SF=1) | 4.096 Mbps |
| CDMA CHANNEL BANDWIDTH (SF=16) | 256 kbps |
| CDMA CHANNEL BANDWIDTH (SF=128) | 32 kbps |
| MODULATION FACTOR | 1.17 bps/Hz |
| | 16-QAM w/R=4/5 CODING (3.2 BITS/SYM) |
| | 3.5 MHz |
| | 2.56 Mcps |
| | 8.192 Mbps |
| | 8.192 Mbps |
| | 8.192 Mbps |
| | 512 kbps |
| | 64 kbps |
| | 2.34 bps/Hz |
| | 64-QAM w/R=4/5 CODING (4.8 BITS/SYM) |
| | 3.5 MHz |
| | 2.56 Mcps |
| | 12.288 Mbps |
| | 12.288 Mbps |
| | 12.288 Mbps |
| | 768 kbps |
| | 96 kbps |
| | 3.511 bps/Hz |

FIG.4 HYPOTHETICAL PARAMETERS FOR A 3.5 MHz RF CHANNELIZATION

| NUMBER OF ELEMENTS | QPSK | | 16 QAM | | 64 QAM | |
|--------------------|---------------------------|-------------------|---------------------------|-------------------|---------------------------|-------------------|
| | AGGREGATE CAPACITY (Mbps) | MODULATION FACTOR | AGGREGATE CAPACITY (Mbps) | MODULATION FACTOR | AGGREGATE CAPACITY (Mbps) | MODULATION FACTOR |
| 1 | 4.096 | 1.17 | 8.192 | 2.34 | 12.288 | 3.511 |
| 2 | 8.192 | 2.34 | 16.384 | 4.68 | 24.576 | 7.022 |
| 4 | 16.384 | 4.68 | 32.768 | 9.36 | 49.152 | 14.044 |
| 8 | 32.768 | 9.36 | 65.536 | 18.72 | 98.304 | 28.088 |
| 16 | 65.536 | 18.72 | 131.072 | 37.44 | 196.608 | 56.176 |

FIG.5 AGGREGATE CAPACITY AND MODULATION FACTORS VERSUS MODULATION TYPE AND ARRAY SIZE

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$$x_n(t) = \sum_{\ell=1}^{L_n} \alpha_{n,\ell} a(\Theta_{n,\ell}) s_n(t - \tau_{n,\ell}) \quad \text{FIG. 6A}$$

$$v_n = \sum_{\ell=1}^{L_{op}} \alpha_{n,\ell} a(\Theta_{n,\ell}) \exp(-j\omega_c \tau_{n,\ell}) \quad \text{FIG. 6B}$$

$$y_n(t) = [w_{n,1}^* \quad w_{n,2}^* \quad \wedge \quad w_{n,M}^*] \begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_M(t) \end{bmatrix} = w_n^H x(t) \quad \text{FIG. 6C}$$

$$R_{ii}(n) = \sum_{i=1, i \neq n}^N \sigma_s^2 v_i v_i^H + \sigma_n^2 I_M \quad \text{FIG. 6D}$$

$$\text{SINR}_{\text{opt}} = \sigma_s^2 v_n^H R_{ii}^{-1}(n) v_n \quad \text{FIG. 6E}$$

$$\text{SINR}_{\text{opt}}(2) = \frac{\sigma_s^2}{\sigma_n^2} \left[\|v_1\|^2 - \frac{\sigma_s^2 |v_1^H v_2|^2}{\sigma_n^2 + \sigma_s^2 \|v_2\|^2} \right] \quad \text{FIG. 6F}$$

$$\text{SINR}_{\text{opt}}(2) = \frac{\sigma_s^2}{\sigma_n^2} \left[M - \frac{\sigma_s^2 |v_1^H v_2|^2}{\sigma_n^2 + M \sigma_s^2} \right] \approx M \frac{\sigma_s^2}{\sigma_n^2} \left[1 - \frac{|v_1^H v_2|^2}{M^2} \right] \quad \text{FIG. 6G}$$

$$\xi_n(c) = \sum_{i \in S_c} |v_n^H v_i|^2 \sum_{i \in S_c} \rho_{n,i} \quad \text{FIG. 6H}$$

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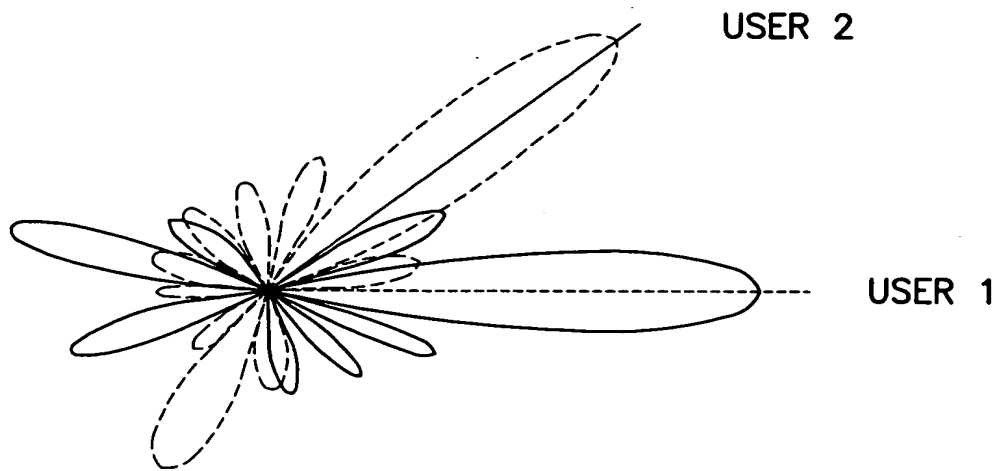


FIG. 7

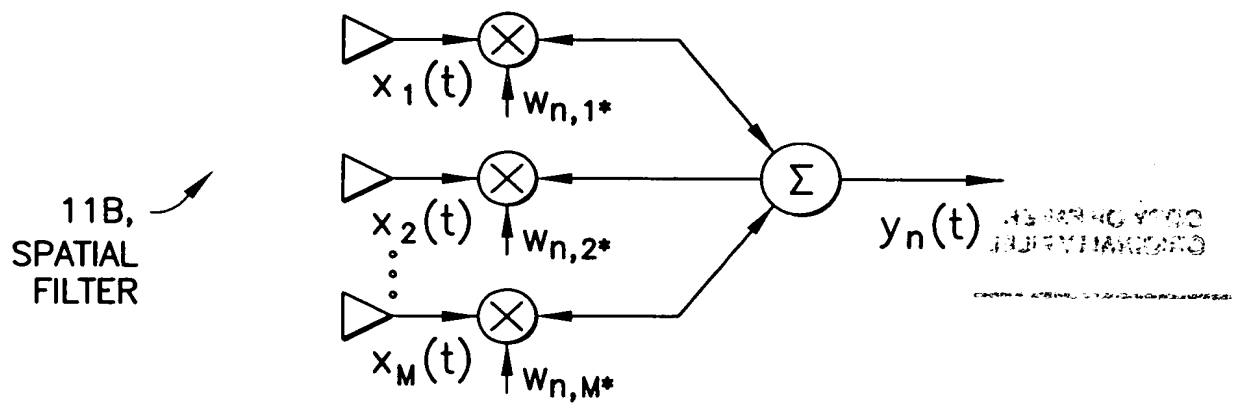


FIG. 8

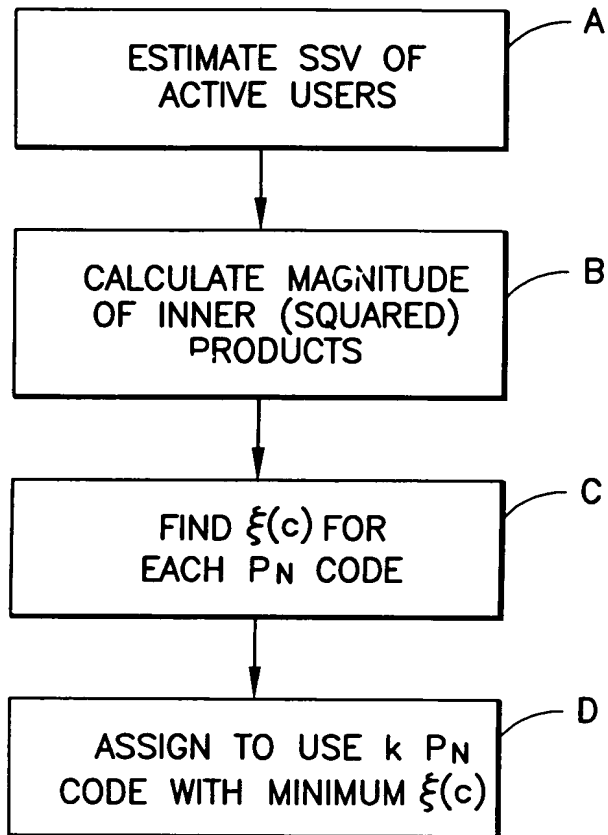


FIG.9

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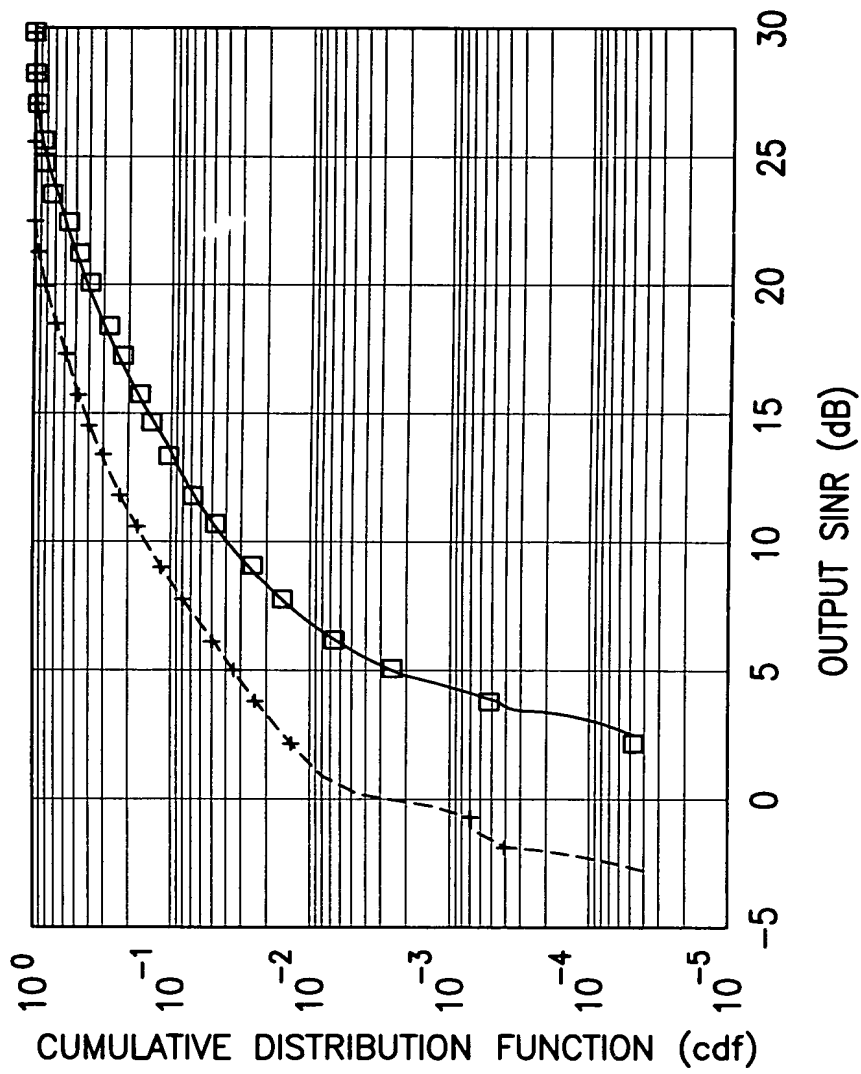


FIG.10

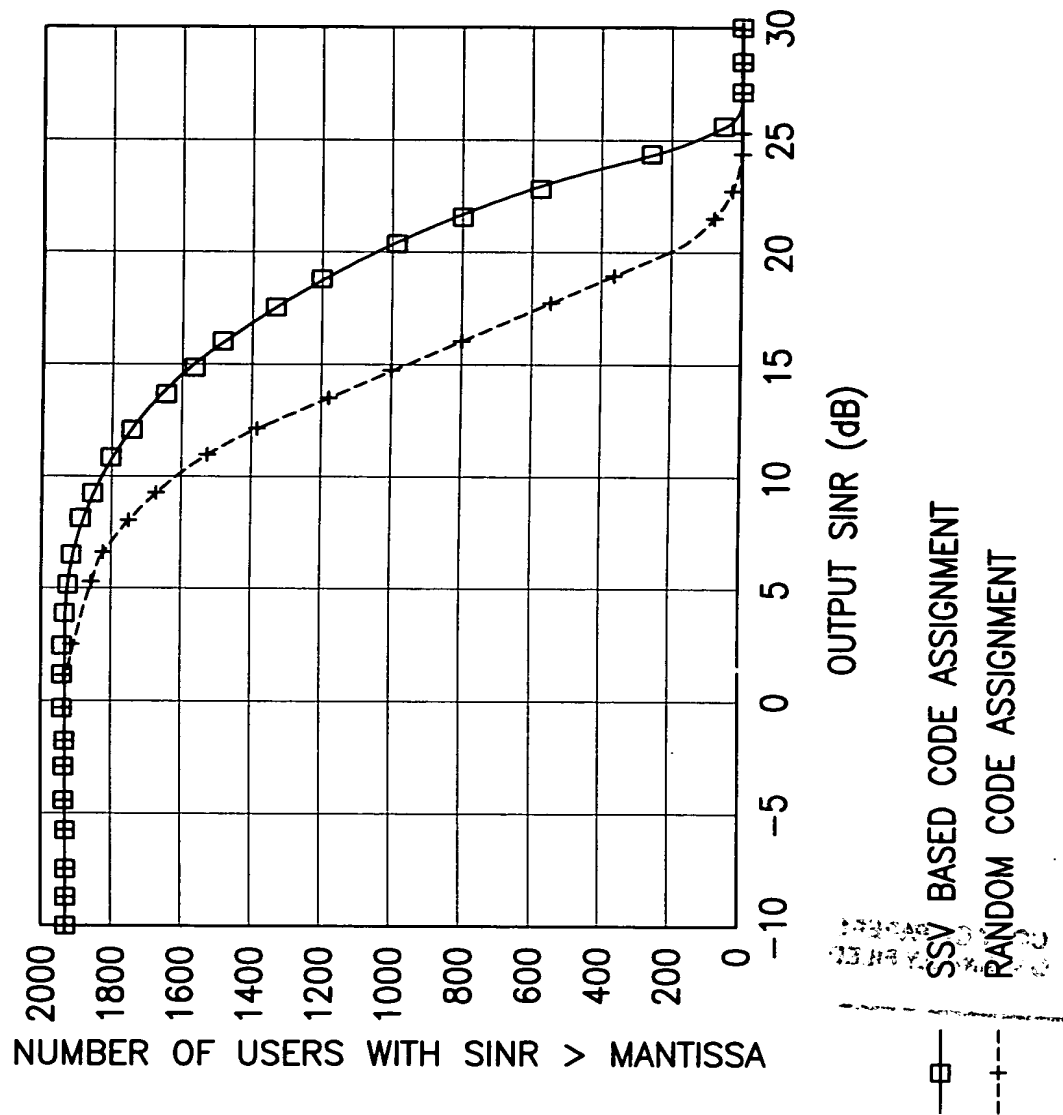


FIG.11

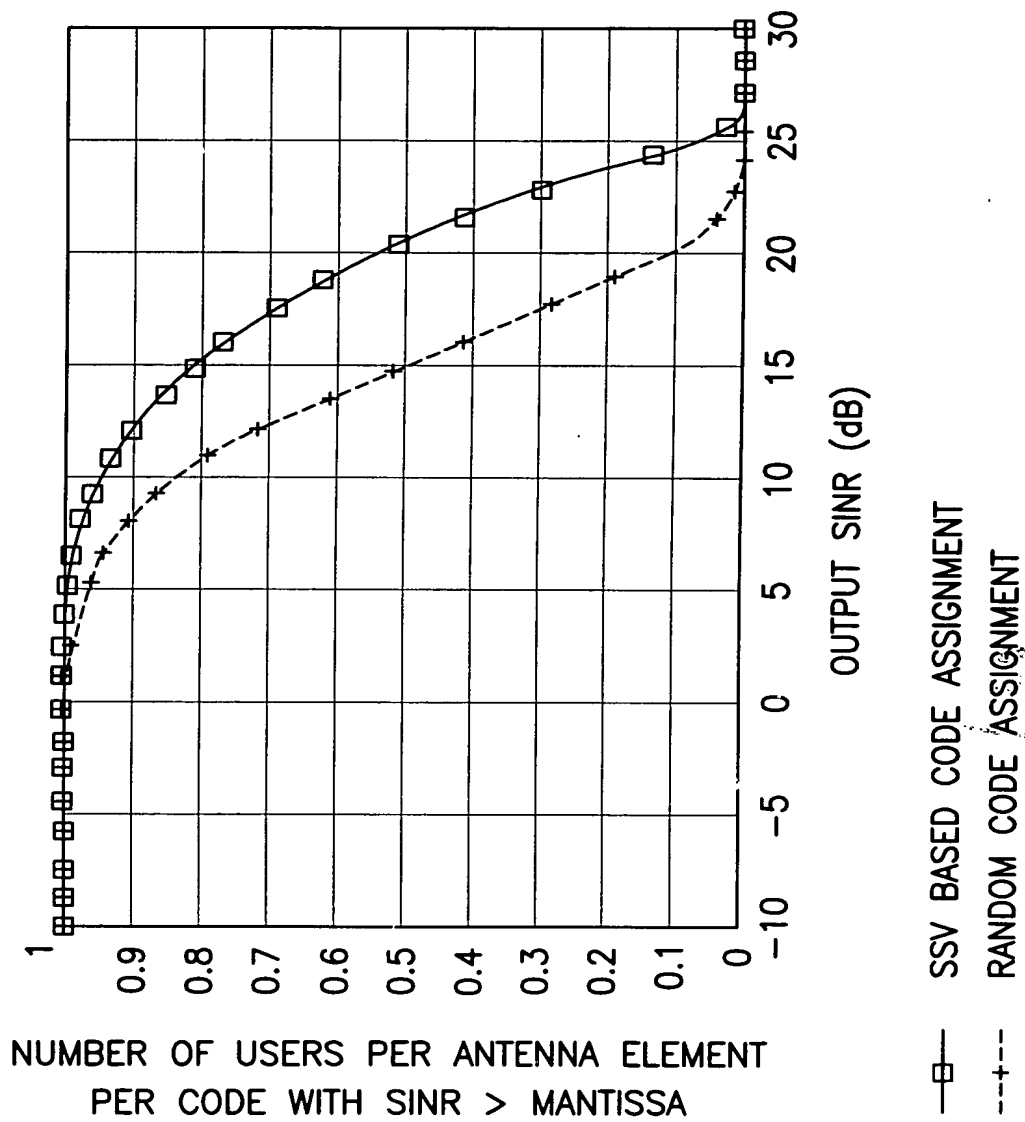


FIG.12